expense incurred show that citrus fruit growing will be rapidly restored to its former prestige.

When writing the above Mr. Mitchell could hardly have anticipated that the month of February, 1900, would have brought to Florida a freeze almost as severe as that of February, 1899. The morning reports for February 19 show a minimum of 28° at Jupiter, so that undoubtedly freezing weather prevailed from latitude 26° northward throughout the Peninsula. There certainly have been a number of severe freezes in Florida during the past six years, but we believe that the time will soon come when there will be a temporary let up on severe blizzards, but even if they should continue, there is no reason to doubt but what agriculture in Florida can be made profitable by the proper use of protective devices.

HISTORICAL EVENTS IN METEOROLOGY.

In the report of the New Mexico section for November, 1899, Mr. R. M. Harding gives an interesting list of historic cold winters, mostly in Europe. It would be a welcome contribution to American meteorology if our section directors and observers would overhaul files of newspapers, magazines, and ancient manuscript records, and also by conversation with the oldest inhabitants, collect the rapidly disappearing records of the weather in their respective States. At the close of Mr. Harding's list, he says:

In 1863–64 a severe cold wave swept over the whole of North America. The thermometer went to 60° below zero in the Northwest. The Mississippi River was blocked with ice in a single night, and in twelve hours froze from St. Paul, Minn., to Cairo, Ill.

IRRIGATION IN WINTER.

In the November report of the Arizona section Mr. W. G. Burns, Section Director, publishes a short article by Prof. A. J. McClatchie on the effect of winter irrigation of an orchard. Of course, the ordinary custom of the farmer is to delay irrigation until drought threatens the welfare of plants or crops. In the present case it was proposed to anticipate the light rains and droughts of the dry season by saturating the soil during the winter, or rainy season, when water is usually abundant. Professor McClatchie irrigated an isolated peach and apricot orchard by the furrow system eight times between December and March; the surface soil was cultivated twice when it became dry, and also plowed and harrowed once after the irrigation. The moisture content of the soil was determined by examining samples at each foot from the surface down to the ground water during April, May, June, and September, and by following the roots it was shown that the water, to a depth of 20 feet, was utilized by the trees. In general the roots passed downward through 10 feet of gravel and 4 feet of clay. The samples indicated that the irrigating water penetrated to a depth of 24 feet. The moisture increased down to the 16th foot, then it diminished to the 26th foot, then increased again until ground water was reached at 34 feet. A second set of samples, taken in May, showed that the capillary action upward had about kept pace with the evaporation. The third set of samples, taken in June, showed that the upper 5 feet had become quite dry, but there was still plenty of water within reach of the deeper roots. The fourth samples, taken in September, showed that the upper 15 feet were comparatively dry, but the lower extremities of the roots were still surrounded by the moist soil. The trees grew thriftily, were well loaded with fruit of excellent quality, and at the close of the season were in fine condition, although they had received but one irrigation since March.

The general result of this experiment shows the importance of irrigating very early and, in fact, throughout the winter, thereby dispensing with the labor of irrigation during the summer and utilizing to the utmost the winter rain and melted snow in the arid region of the United States.

THE WEATHER BUREAU AND COMMERCE ON THE GREAT LAKES.

In the December report of the Michigan section, Mr. C. F. Schneider, Section Director, gives a number of items relative to the navigation of the Great Lakes during 1898 and 1899, from which we take the following:

Number of vessels, 20,255; number of passages during the season, through the Detroit River, either way, 22,741; number of passengers, 49,082; bushels of wheat, 58,397,355; barrels of flour, 7,114,147; tons of iron ore, 15,328,240; feet of lumber, board measure, 1,038,077,000. There are about as many clearances of vessels at lake ports as there are from all the seaports of the United States combined.

The Weather Bureau furnished the masses of vessels passing Detroit 16,200 weather maps and 22,500 weather forecasts, storm warnings and special afternoon reports of the wind. No vessel of importance passes Detroit without getting its weather map and forecasts.

The astonishing importance of the commerce of the Great Lakes depends partly upon the fact that so many vessels leave the lake ports directly for Europe and Asia. During the nine months of the year when the Sault Ste. Marie Ship Canal is open to navigation two and a half times as much tonnage passes through it as passes the Suez Canal during the entire twelve months. The registered tonnage passing Detroit during the nine months is more than that of New York, London, and Liverpool combined. The fact that the merchandise is largely wheat, flour, iron, and lumber, instead of silks and teas and manufactures of all kinds, does not in the least diminish its importance or the responsibility of the Weather Bureau in regard to this commerce.

MIRAGE.

In the January report of the South Dakota section, Mr. S. W. Glenn, Section Director, says:

The observer at Desmet reports an unusually strong mirage in that vicinity on December 21, 1899. The town lies just north of a considerable rise in the prairie, which shuts it from view to persons approaching from the south. The observer says: "To persons south of the town the hills appeared to vanish and Desmet could be plainly seen, apparently up in the air."

THE HIGH STATIONS OF WYOMING.

The November report of the Wyoming section contains a chart showing graphically the monthly precipitation at Cheyenne from 1871 to 1899, inclusive, in which the large percentage during the months of April, May, June, July, and occasionally August, stand out very prominently. Cheyenne has always been considered one of the high stations of the Weather Bureau service. For a long time it and Mount Washington were our only important high stations. Although Cheyenne is but a little lower than Mount Washington, yet it is essentially on a plain or high plateau and not a mountain top. The November report shows that Wyoming has 5 stations betweeen 4,000 and 5,000 feet; 7 stations between 5,000 and 6,000 feet; 10 stations between 6,000 and 7,000 feet; one between 7,000 and 8,000, and 2 between 8,000 and 9,000, with 6 other stations whose elevations are not given in this number of the report, although doubtless they could be estimated accurately to within 100 feet.

The climate of a high plateau offers many interesting peculiarities. Both the diurnal and the annual variations of the various meteorological elements differ entirely from those in the plains near sea level. The fact that the high land is in the interior of a large continent adds another important con-

dition affecting the climate. A plateau of the same height and latitude closely surrounded by an ocean would have a very moist and cloudy climate, and if a little higher up would be covered with snow and glaciers. The conditions that favor the formation of glaciers or permanent fields of snow on such a large scale as once prevailed in eastern North America, can be elucidated by the comparison of the Wyoming plateau with surrounding lowlands. Mr. W. S. Palmer, Section Director for Wyoming, has added to his tables a number of stations outside of the State, and, perhaps, a few more would bring out the general climatological relations that we have in mind.

NEW METEOROLOGICAL TERMS.

Occasionally a word that is new to the Editor is found in the reports of our observers, or in the newspaper and popular literature of the day. Past experience shows that these words may, many years hence, crop up again as proper meteorological terms in use over wide areas. Much labor has been spent in hunting up the origin of the word "blizzard," and we shall probably do a favor to a future generation of historians, if we make a permanent record of these words which are, at present, in very local usage only.

In the January report of the Tennessee section, Mr. H. C. Bate, Section Director, publishes the report of the voluntary observer at Grace, Tenn., to the effect that "the first day of the year is a very cold one; a small 'skift' of snow fell and there was a very cold north wind."

We hope to receive the exact definition and usage of this word "skift."

WINTER THUNDERSTORMS IN MISSISSIPPI.

In the January report of the Mississippi Section, Mr. H. E. Wilkinson, Section Director, states:

Thunderstorms in midwinter are not unknown in the lower Mississippi Valley, but it seldom happend that such an electric disturbance as that of December 10, 1899, occurs, even in summer. During the past ten years nine thunderstorms have been recorded at Vicksburg during the month of December; in some cases two in one month, and in three cases none during the month. The records for twenty-nine years show but eight cases where over 5 inches of rain fell in twenty-four hours and but four cases where the rain was heavier than on December 10. At Vicksburg on this date the thunder and lightning held sway throughout the day and into the night. The morning chart of December 9 showed a moderate depression central over Oklahoma and central Kansas. At 8 p. m. of the 9th this had spread over a large area from Iowa to Texas. By 8 p. m. of Sunday, the 10th, the depression had contracted in area and increased in depth until the barometer reached 29.58 at Little Rock, Ark. At Vicksburg heavy rain fell from early in the morning of the 10th, without intermission, throughout the day, accompanied at times by vivid lightning and terrific thunder. The climax was reached by 5 p. m. The line of 8 inches of rainfall or more was confined to the southwestern counties of the State, the major portion falling between 10 a. m. and 10 p. m. Sunday.

SNOWFALL IN THE ROCKY MOUNTAINS.

In the January report of the Colorado section Mr. F. H. Brandenburg, Local Forecast Official and Section Director, gives his usual summary of the snowfall in the mountains. When these reports have been accumulated for a few years, they will form an invaluable fund of data for the investigation of the laws controlling not only the fall but especially the accumulation of snow in the formation of glaciers. Warm rains, warm sunshine, and dry winds eat up the snow that falls in Colorado so that glaciers are scarcely possible under existing conditions. A slight modification of these conditions made immense glaciers possible in the Rocky Mountain region, and especially in the Lake region and the northern Appalachians during the glacial epoch of geology. Mr. Brandenburg reports that at the close of the current January the depth of snow was only from one-third to one-half as much as at the end of January, 1899, for stations between 7,500 and 10,000 feet, but that for stations in the vicinity of timber line the ratio ranges from one-third to two-thirds. Among the reports of deep snows lying on the ground at the end of the month at timber line we quote the following:

	Inches.
Arkansas watershed:	
Colddale, Fremont County	72
Menger, Las Animas County	[1]72
South Platte watershed:	
Bailey, Park County	36
Jefferson, Park County	36
Rio Grande watershed:	
Wagon Wheel Gap, Mineral County	36
Alder, Saguache County	36
Gunnison watershed:	
Iola, Gunnison County	48
White Pine, Gunnison County	40
Grand watershed:	
Ivanhoe, Pitkin County	60
Watson, Pitkin County	[1]72
Crystal, Gunnison County	84

In the January report of the Idaho section, Mr. S. M. Blandford, Section Director, gives some statistics relative to snow, from which we copy the following:

In general the snowfall is decidedly deficient; it is only in the mountains of Bear Lake and Oneida counties, in the southeastern corner of the State, that the snowfall has approached the average. For comparison with the data in Colorado we copy the following from among the larger figures giving the depth of snow on the ground at the end of the month at timber line:

	Inches.
Snake River watershed:	
Parker, Fremont County	13
Wilfard, Fremont County	26
Bear River and Lake drainage:	
Liberty, Bear Lake County	18
Ovid, Bear Lake County	30
Wood River watershed:	
Corral, Blaine County	24
Boise Basin:	
Atlanta, Elmore County	14

It is evident that there is danger of a deficiency of water in the rivers during the coming spring and summer.

THE RELATION OF TEMPERATURE TO COLOR.

It is quite a common fallacy to say that the darker colors are warmer, whether we speak of clothing or soils. But it is far more proper to say that the darker color is due to the texture and other qualities of the cloth or soil, and that these other qualities (not the color itself) cause the differences as to warmth. In the January report of the Virginia section, Mr. E. A. Evans, Section Director, illustrates this point by a quotation from Johnson's work How Crops Feed, as follows:

"The observations of Malaguti and Durocher prove that the peculiar temperature of the soil is not always so closely related to color as to other qualities. They studied the thermometric characters of the following soils, viz: Garden earth of dark, gray color (a mixture of sand and gravel, with about 5 per cent of humus); a grayish-white quartz sand; a grayish-brown granite sand; a fine light gray clay (pipe clay); a yellow sandy clay; and finally, four lime soils of different physical qualities.

It was found that when the exposure was alike, the dark gray granite sand became the warmest, and next to this the grayish-white quartz sand. The latter, notwithstanding its lighter color, often acquired a higher temperature at a depth of four inches than the former, a fact to be ascribed to its better conducting power. *The black soils never became so warm as the two just mentioned.* After the black soils, the others

[1] On northern slopes.